

WHAT IS CLAIMED IS:

1. A method for treating agricultural waste, the method comprising introducing an alkane substrate to agricultural waste to stimulate the growth of alkane-utilizing bacteria which at least partially digest the agricultural waste.
2. The method of Claim 1, wherein the alkane substrate comprises butane.
3. The method of Claim 1, wherein the alkane substrate comprises butane as the most prevalent compound on a weight percentage basis.
4. The method of Claim 1, wherein the alkane substrate comprises natural gas.
5. The method of Claim 1, wherein the alkane substrate comprises propane.
6. The method of Claim 1, wherein the agricultural waste comprises animal waste.
7. The method of Claim 6, wherein the animal waste comprises manure.
8. The method of Claim 6, wherein the animal waste comprises urine.
9. The method of Claim 6, wherein the animal waste is provided from at least one animal selected from the group consisting of horses, cows, cattle, pigs, sheep, chickens, goats and turkeys.
10. The method of Claim 6, wherein the animal waste is provided in the form of a slurry.
11. The method of Claim 1, wherein the agricultural waste comprises vegetable material, leaf material, plant material, composting material and/or waste paper product.
12. The method of Claim 1, further comprising introducing an oxygen-containing gas to the agricultural waste.
13. The method of Claim 12, wherein the oxygen-containing gas comprises air.
14. The method of Claim 1, further comprising introducing water to the agricultural waste.

15. An apparatus for treating agricultural waste, comprising:

a waste containment vessel;

a source of alkane substrate; and

an alkane injector line in flow communication with the waste containment vessel and the source of alkane substrate.

16. The apparatus of Claim 15, further comprising an outlet line in flow communication with the waste containment vessel for transport of at least partially digested agricultural waste from the waste containment vessel.

17. The apparatus of Claim 16, further comprising an injection distribution network in flow communication with the outlet line for transport of the at least partially digested agricultural waste from the outlet line to a field.

18. The apparatus of Claim 17, wherein the injection distribution network transports the at least partially digested agricultural waste to the field intermittently.

19. The apparatus of Claim 17, wherein the injection distribution network continuously.

20. The apparatus of Claim 15, further comprising:

a source of oxygen-containing gas; and

an oxygen-containing gas injector line in flow communication with the source of oxygen-containing gas and the waste containment vessel.

21. The apparatus of Claim 20, wherein the oxygen-containing gas injector line is separate from the alkane injector line.

22. The apparatus of Claim 15, further comprising:

a source of water; and

a water injector line in flow communication with the source of water and the waste containment vessel.

23. The apparatus of Claim 15, wherein the alkane substrate comprises butane.

24. An apparatus for treating agricultural waste, the apparatus comprising a means for introducing an alkane substrate into the agricultural waste to at least partially digest the agricultural waste.

25. A method for producing plant growth-enhancing material, the method comprising:

introducing an alkane substrate to agricultural waste to stimulate the growth of alkane-utilizing bacteria which at least partially digest the agricultural waste;  
and

recovering plant growth-enhancing material comprising the at least partially digested agricultural waste.

26. The method of Claim 25, wherein the alkane substrate comprises butane.

27. The method of Claim 25, wherein the agricultural waste comprises animal waste.

28. The method of Claim 27, wherein the animal waste comprises manure.

29. The method of Claim 27, wherein the animal waste comprises urine.

30. The method of Claim 27, wherein the animal waste is provided from at least one animal selected from the group consisting of horses, cows, cattle, pigs, sheep, chickens, goats, and turkeys.

31. The method of Claim 25, wherein the agricultural waste comprises vegetable material, leaf material, plant material, composting material and/or a waste paper product.

32. A plant growth-enhancing material comprising alkane-utilizing bacteria and a carrier material.

33. The plant growth-enhancing material of Claim 32, wherein the alkane-utilizing bacteria comprise butane-utilizing bacteria.

34. The plant growth-enhancing material of Claim 32, wherein the carrier material comprises at least partially digested agricultural waste.

35. The plant growth-enhancing material of Claim 34, wherein the agricultural waste comprises animal waste.

36. The plant growth-enhancing material of Claim 32, wherein the carrier material comprises water.

37. A plant growth-enhancing material comprising an alkane substrate and a carrier material.

38. The plant growth-enhancing material of Claim 37, wherein the alkane substrate comprises butane.

39. The plant growth-enhancing material of Claim 37, wherein the carrier material comprises at least partially digested agricultural waste.

40. The plant growth-enhancing material of Claim 39, wherein the agricultural waste comprises animal waste.

41. The plant growth-enhancing material of Claim 37, wherein the carrier material comprises water.

42. A method for treating soil to enhance plant growth, the method comprising introducing alkane-utilizing bacteria to the soil.

43. The method of Claim 42, wherein the alkane-utilizing bacteria comprise butane-utilizing bacteria.

44. The method of Claim 42, wherein the alkane-utilizing bacteria are introduced to the soil with a carrier material.

45. The method of Claim 44, wherein the carrier material comprises at least partially digested agricultural waste.

46. The method of Claim 45, wherein the animal waste is located in a slurry tank.

47. The method of Claim 44, wherein the agricultural waste comprises vegetable material, leaf material, plant material, composting material and/or a waste paper product.

48. The method of Claim 42, wherein the carrier material comprises water.

49. A method for treating soil to enhance plant growth, the method comprising introducing an alkane substrate and a carrier material to the soil.

50. The method of Claim 49, wherein the alkane substrate comprises butane.

51. The method of Claim 49, wherein the carrier material comprises at least partially digested agricultural waste.

52. The method of Claim 51, wherein the agricultural waste comprises animal waste.

53. The method of Claim 51, wherein the agricultural waste comprises vegetable material, leaf material, plant material, composting material and/or a waste paper product.

54. The method of Claim 49, wherein the carrier material comprises water.

55. A method of enhancing plant growth, the method comprising introducing alkane-utilizing bacteria into a location adjacent to a plant.

56. The method of Claim 55, where the alkane-utilizing bacteria are introduced with a carrier material.

57. The method of Claim 56, wherein the carrier material comprises at least partially digested agricultural waste.

58. The method of Claim 56, wherein the carrier material comprises water.

59. A method of enhancing plant growth, the method comprising introducing an alkane substrate and a carrier material into a location adjacent to a plant.

60. The method of Claim 59, wherein the carrier material comprises at least partially digested agricultural waste.

61. The method of Claim 59, wherein the carrier material comprises water.